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(De)Centralization and Voter Turnout: Theory and Evidence from German Municipalities

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Abstract

A vast academic literature illustrates that voter turnout is affected by the institutional design of elections (e.g., compulsory voting, electoral system, postal or Sunday voting). In this article, we exploit a simple Downsian theoretical framework to argue that the institutional framework of public good provision – and, in particular, the distribution of political and administrative competences across government levels – likewise affects voters' turnout decisions by influencing the expected net benefit of voting. Empirically, we exploit the institutional variation across German municipalities to test this proposition, and find supportive evidence.

Keywords*: Voter turnout, Institutions, Federalism, Paradox of voting.*

JEL-Classification: *D70, D72, H11, H40*

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1. Introduction

The question why people participate in elections has triggered much debate among both political scientists and economists. Particularly explaining the *level* of turnout in most elections proves challenging. Theories based on a rational comparison of costs and benefits (inspired by Downs 1957) indeed predict large-scale abstention on Election Day, since the probability of bringing about one's preferred outcome is in most cases extremely small. As this clearly goes against the empirical observation that many people do vote, various authors have introduced an additional benefit due to 'expressive utility' (Brennan and Lomasky 1993; Brennan and Hamlin 2000; Hillman 2010; Jennings and Hamlin 2011) to escape the 'paradox of voting' (Riker and Ordeshook 1968: p. 31).

Considerable progress has, however, been made in explaining voters' turnout decisions *at the margin* (Matsusaka 1995; Geys 2006a; Andersen et al. 2012). That is, a large number of factors have been identified as important in just tipping the balance between abstention and voting in an individual's decision-making process (for overviews, see Blais 2006; Geys 2006a,b). A significant share of this literature focuses on how a jurisdiction's institutional setting affects voters' cost-benefit calculation. Still, much of this 'institutional' literature concentrates on the effects of diverse voting systems (e.g., compulsory voting, registration systems, quorum rules, concurrent elections, computerized voting) using cross-country comparisons (e.g., Roseman and Stephenson 2005; Aguiar-Conraria and Magalhães 2010). In this article, we instead analyze the impact of the institutional design of (local) public good provision.

To the best of our knowledge, only one previous study deals with a similar topic. Hajnal and Lewis (2003) show that outsourcing municipal tasks negatively affects

voter turnout because, so their argument goes, it induces a loss of political influence among local governments (which reduces voters' benefits of casting their ballots). We take a more general approach inspired by the literature on fiscal federalism and public finance, and evaluate the impact of the distribution of political and administrative competences for (local) public good provision. Even though such institutions have long been acknowledged to matter for the efficiency of public good provision (Tullock 1965; Olson 1969; Oates 1972; Brennan and Buchanan 1980), its effect on voter turnout has not been analyzed. Yet, as we will argue in more detail below, different institutional frameworks for the provision of public goods influence voters' expected benefits of voting, and thus are likely to affect turnout decisions 'at the margin'.

We assess the ensuing theoretical predictions using German local elections as our empirical test case. Compared to cross-country studies, this local setting allows analyzing turnout variation in a more homogenous socio-cultural environment, such that we can concentrate on the institutional variation in which we are interested. Moreover, Germany provides an ideal setting for our purposes since governments at the LAU 1 level[1] have an almost identical range of public administrative tasks across the German nation, but show wide diversity in terms of local self-administration (i.e., *who* is elected to decide *if*, *how* and *how much* of a fixed set of public goods should be provided). Our main results suggest that – in line with theoretical predictions – centralized decisions over all types of public goods within the municipality depresses turnout in municipal elections, while a

1 LAU stands for 'Local Authority Unit' and is a classification issued by Eurostat. While LAU 2 is the municipal level, LAU 1 captures different forms of inter-municipal cooperation.

federal government structure (which ties political decision-making authority more closely to the geographic reach of different public goods) increases voter turnout.

The remainder of the article is structured as follows. The next section discusses the theoretical background, and brings forward our central research hypotheses. Section 3 brings forward the empirical approach, while section 4 presents our main findings. Section 5 concludes.

2. Theoretical background and hypotheses

In section 2.1, we build on the fiscal federalism literature to introduce three distinct institutional systems for (local) public good provision wherein the public goods involved have varying geographical reaches. While these are currently employed to differing extents in Germany (see below) as well as other countries, they can here best be viewed as three archetypes. In section 2.2, we discuss their effects on voter turnout using the standard Downsian framework. As mentioned, we thereby aim to derive hypotheses (summarized in section 2.3) explaining turnout decisions at the margin, rather than absolute levels of turnout.

2.1 Types of local public governance

Olson's (1969) principle of fiscal equivalence holds that there should be "congruence between the geographical scopes of government actions and their financing" (Enderlein 2009: 3). A similar idea is captured in Oates's (1972, 1999) decentralization theorem, which argues that "the provision of public services should be located at the lowest level of government encompassing […] the relevant benefits and costs" (Oates 1999: 1122). A radical interpretation of these ideas would involve the implementation of different governments for nearly every public good, which is untenable due to the excessive costs of such a multitude of

administrations. Consequently, different institutional designs can be observed in reality for the provision of the same set of 'local' public goods (where the apostrophes indicate that the geographic reach of different local public goods may vary).[2] These institutional settings can be categorized in roughly three prototypes, which differ with respect to *who* is elected to decide *if*, *how* and *how much* local public goods should be provided.

The first type of government – which we refer to as 'centralized municipalities' – concentrates all competencies in public good provision at one central level of local government, such that the differing geographic reaches of various local public goods simply are ignored. That is, decisions on the amount of public good provision are taken and implemented by one encompassing municipal parliament, which is elected in one single election. We illustrate this on the left-hand side of Figure 1. The municipal borders are represented by the dark black line, and indicate the boundary of public goods benefiting the entire municipal population (referred to as 'municipal' public goods). The thin grey lines represent the boundaries of more localized public goods whose benefits only accrue to one intra-municipal community (referred to as 'community' public goods).[3] These intra-municipal communities do not, however, have their own representative bodies to decide over community public goods. Hence, both community and municipality public goods are decided and administered under central control (reflected by the fact that both are colored in a common grey shade in Figure 1).

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2 For simplicity, we assume throughout the paper that there are two types of public goods: *i)* one where the costs/benefits are localized to a small subgroup within the municipality (e.g., child care centers, local parks) and *ii)* one where the costs/benefits cover the entire municipality (e.g., municipal roads).

3 In the German setting analyzed below, these communities often reflect previously independent municipalities that merged into one new (larger) municipality.

Figure 1 about here

The second type of government – which we refer to as ‘federal municipalities’ – comes closer to the ideal-type described under the decentralization theorem, and consists of two bodies of government: i.e., one with responsibility over community public goods, and one with responsibility over municipal public goods. This setting is depicted in the right-hand side of Figure 1 by the white and grey shades, respectively. Although the competencies within the municipality remain the same as before, the internal organization thereof is different. That is, there are now two independently elected parliaments deciding upon the amount of community and municipality public goods, respectively. Citizens therefore also have two votes (which, in the German case, are cast on the same Election Day): i.e., one to elect the members of the community council administering community public goods, and one to elect the members of the municipal parliament administering municipal public goods.

Finally, the center of Figure 1 depicts the intermediate situation of ‘confederal municipalities’. These concentrate political authority over public good provision predominantly at the local level in the sense that each community within the municipality elects its own parliament, which is then – as in federal municipalities – solely responsible for community public goods (as indicated by the white areas in Figure 1). Unlike federal municipalities, however, there is no directly elected municipal government, but rather a joint administrative council with deputies sent by each community within the municipality, which decides consensually about municipal public goods. Hence, as for centralized municipalities, voters have only

one vote. This elects the community council directly, and affects indirectly the composition of the joint administrative council at the municipal level.

2.2 Effects on voter turnout

To evaluate the effect of such institutional differences in local public good provision, we start from classical rational voter theory (Downs 1957), where the net benefit of voting (R) is:

$$R = \rho B - C \tag{1}$$

In Eq. (1), $B = U_Y - U_Z$ is the difference in expected utility from the policy alternatives proposed by parties Y and Z, respectively;[4] C is the cost of voting arising from, for example, gathering information and getting to the polling booth; and ρ is the probability of being pivotal in favor of one's most desired policy. Note that we hereby follow Matsusaka's (1995) interpretation of the meaning of ρ, rather than the slightly more restrictive Downsian version (i.e., ρ as the probability of being pivotal in the political decision-making process versus the probability of being pivotal in the election). While both interpretations are equivalent under majority rule (absent political agency effects), Matsusaka's (1995) interpretation is more appropriate under non-majoritarian systems characterized by coalitions, bargaining and/or logrolling since simply tipping the election might not be sufficient to bring about one's most desired policy (this will be particularly relevant in our empirical setting below).

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4 Although we introduce only two parties (Y and Z) in our model formulation, the Downsian model – and our use of it here – can easily be extended to a setting with multiple parties and coalition formation (see McKelvey and Ordeshook 1972; Geys and Heyndels 2006). As this does not add additional theoretical insights, but complicates the notation, we refrain from doing so here.

Introducing institutional differences in public good provision in this framework, and evaluating how these affect individuals' turnout decisions at the margin (Matsusaka 1995; Geys 2006a; Andersen et al. 2012) requires some additional notation. First, utility can derive from community (U_{com}) or municipal public good consumption (U_{mun}), and each of two parties (Y and Z) promises to produce a certain amount of each of these goods (also subscripted by *com* and *mun*, respectively). Second, elections can be held within each community (among its n_{com} voters) and/or within the municipality as a whole (among its n_{mun} voters), where the municipal electorate is the sum of all communities' sub-electorates ($n_{mun} = \sum n_{com}$). Finally, we assume that the individual costs of voting are independent of institutional design of local public good provision, and are identical across the municipal types.

Introducing these elements into Eq. (1) according to the institutional attributes of centralized municipalities leads to the following net benefit from voting in such municipalities:

$$R^{Cen} = \rho_{mun} \,.\, |(U_{Y,mun} + U_{Y,com}) - (U_{Z,mun} + U_{Z,com})| - C \qquad (2)$$

Voters thus choose the party (Y or Z) offering the optimal bundle of community and municipality public goods. Since in this case there is only one election held at the municipal level, the probability of being decisive in favor of one's desired policy bundle is ρ_{mun}.

Similarly, for federal municipalities, Eq. (1) becomes:

$$R^{Fed} = \rho_{com} \,.\, |U_{Y,com} - U_{Z,com}| + \rho_{mun} \,.\, |U_{Y,mun} - U_{Z,mun})| - C \qquad (3)$$

Voters are now able to cast separate votes for the community and municipality councils. Hence, a vote for a certain community policy (which is pivotal with probability ρ_{com}) is unconditional on, and thus additively separable from, the choice of a municipal policy (which is pivotal with probability ρ_{mun}).

Finally, for confederal municipalities, there is only one community-level election, in which a voter must choose the party (*Y* or *Z*) offering the optimal bundle of community and municipality public goods. One's vote is pivotal for the community policy choice ($|U_{Y,com} - U_{Z,com}|$) with probability ρ_{com}. Moreover, through the selection of the members of the joint administrative council from the community councils (see above), a vote also influences municipal public good provision ($|U_{Y,mun} - U_{Z,mun}|$) with some probability that depends on the probability of being pivotal in the community election, i.e., $\rho_{mun} = f(\rho_{com})$). Still, as each voter has only one vote and thus has to evaluate the overall benefit $|(U_{Y,mun} + U_{Y,com}) - (U_{Z,mun} + U_{Z,com})|$ on Election Day, the probability of being pivotal for this overall benefit becomes a more complicated function of ρ_{com}. Hence, Eq. (1) becomes:

$$R^{Con} = h(\rho_{com}, f(\rho_{com})) \; . \; |(U_{Y,mun} + U_{Y,com}) - (U_{Z,mun} + U_{Z,com})| - C \qquad (4)$$

Using Equations (2), (3), and (4), two important effects of the institutional design of public good provision can be distinguished for a given set of public policy offers by both parties. The first relates the benefit-term *B*, and second is related to the probability term ρ.

2.2.1 The benefit of voting (B)

Comparing Equations (2), (3), and (4), the benefit term in the voter's calculation is clearly the same in confederal and centralized municipalities. That is, since voters only have one vote, they have to optimize the expected payoff by choosing

the party offering the best policy bundle at the community and the municipal level: i.e., $B^{Con} = B^{Cen} = |(U_{Y,mun} + U_{Y,com}) - (U_{Z,mun} + U_{Z,com})|$. In federal municipalities, however, voters have two votes and can optimize by choosing their preferred policy at the community and the municipal level: $B^{Fed} = |U_{Y,com} - U_{Z,com}| + |U_{Y,mun} - U_{Z,mun})|$. It follows directly that the benefit of voting (B) in federal municipalities is never less than that in confederal or centralized municipalities, and is likely to be higher: $B^{Fed} \geq B^{Con} = B^{Cen}$. This is illustrated with a simple numerical example in Figure 2.

Figure 2 about here

2.2.2 The probability of being pivotal (ρ)

A vote is decisive when it creates or breaks an exact tie in favor of one's preferred policy outcome (Matsusaka 1995). Commonly, this is argued to be an inverse function of the electorate's size and a direct function of the election's closeness (Beck 1975; Owen and Grofman 1984; Hansen et al. 1987; Dhillon and Peralta 2002). However, as mentioned, moving beyond a unitary system with majoritarian voting (i.e., the standard Downsian setting), this probability will also be affected by the precise institutional design.

Clearly, the three types of local public governance discussed in section 2.1 influence the number of eligible voters deciding upon public good provision at the community and municipality level. Specifically, in centralized municipalities, elections are held only at the level of the municipality. Hence, the number of voters is n_{mun}. In both confederal and federal municipalities, elections either only or also take place at the community level, with n_{com} voters. As by definition $n_{mun} >$

n_{com}, the probability of casting a decisive vote is larger in the latter two systems compared to centralized municipalities. Moreover, in federal and confederal municipalities, voters can influence community-level policies directly and also can affect the bargaining power at the municipal level (via the municipal vote in federal municipalities and via one's community representation at the municipal level in confederal municipalities). This results in a great chance of being pivotal *on overall public policy* than in centralized municipalities. In other words, even for a given size of the electorate, a voter becomes more powerful in federal and confederal settings compared to a centralized setting.[5] The direct implication is that the probability of affecting the policy outcome is least in centralized municipalities.

Comparing the chances of being pivotal in federal and confederal municipalities is not straightforward as this depends on how ρ_{mun} (under the federal system) relates to f(ρ_{com}) under the confederal system (see above). To the extent that, compared to federal municipalities, the effect of a smaller electorate in confederal municipalities is roughly compensated by the representative character of the joint administrative council, we have that: $\rho^{Fed} \approx \rho^{Con} > \rho^{Cen}$. It is important to point out, however, that the exact relative size of ρ^{Fed} versus ρ^{Con} is innocuous for our key predictions as long as their magnitudes do not outweigh the difference in the benefits of voting (B) in both governance types (see below).

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5 In the German setting, this is particularly true since decisions at the municipal level are taken consensually. Moreover, from a legal perspective, all communities remain independent and *can* oppose any decision of the joint administrative council by exercising their veto right. While that option provides a strong threat and determines each community's bargaining power at the municipal level, it is an extremely rare occurrence in reality.

2.3 Hypotheses

To summarize, this discussion leads to the following hypotheses. First, based on our arguments regarding the effects of institutional design on both the benefit of voting ($B^{Fed} \geq B^{Con} = B^{Cen}$) and the probability of influencing the election outcome ($\rho^{Fed} \approx \rho^{Con} > \rho^{Cen}$),[6] we hypothesize that:

(H1a) Compared to confederal and centralized provision of local public goods, voter turnout is highest under federal provision.

(H1b) Compared to federal and confederal provision of local public goods, voter turnout is least under fully centralized provision.

The intuition underlying H1a is that federal municipalities allow voters to express a distinct preference for a certain set of preferred *policies* (possibly offered by two different parties), rather than have to choose a single *party* that may not implement their preferred policy for both public goods. This increases the benefit of voting (B). At the same time, voters' probability of being pivotal in bringing such optimal outcome about (ρ) is at least as large in federal municipalities as in the centralized and confederal systems. Similarly, the intuition for H1b is that voters' probability of being pivotal (ρ) are lowest in this system. Moreover, the benefit from voting (B) is at most as great as under the federal and confederal systems.

6 Remember that these orderings are derived independently of the effects different institutional settings may have on electorate size and election closeness (i.e., the traditional determinants of ρ). In our empirical analysis below, we will therefore test the ensuing hypotheses H1a and H1b controlling for these two elements.

3. Empirical implementation

3.1 Empirical model and data

We evaluate the hypotheses formulated above using a large sample of German municipalities. Germany provides an ideal setting for such test since governments at the LAU 1 level have an almost identical range of public administrative tasks across the German nation, but differ in terms of local self-administration (conforming to the three governance types described above).[7] Our data derive from the German Federal Statistical Office. While the original dataset covers all German municipalities at the LAU 1 level (over 4550 municipalities), we impose two restrictions. First, we drop all observations from so-called 'kreisfreie Staedte' (i.e., large independent cities) and from the city states of Berlin, Bremen and Hamburg. The reason is that these entities carry out additional tasks at higher administrative levels (county and state), and thus are not fully comparable to the other municipalities in our sample. Second, we restrict the sample to local elections that took place in the national legislative period between 2002 and 2005 to ensure sufficiently comparable political conditions at the national level.[8] With some additional municipalities falling from the sample due to data availability issues, our final dataset consists of 1,660 municipalities from seven German federal states (see Table 1).

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7 For more details on Germany's federal system, municipal tasks and comparisons of municipal types, we refer the interested reader to Biehl (1994), Zimmermann (1999) and Rosenfeld et al. (2007), respectively.

8 This issue is strengthened by the fact that the 2005 national election was originally scheduled for 2006. As the rescheduling was announced by Chancellor Schroeder in May 2005, the campaign for the national election of 2005 did not affect the local elections contained in our sample that were held in 2004. This restriction excludes observations from Bavaria (which held local-level elections in 2002 and 2008) and Lower Saxony (with local-level elections in 2001 and 2006).

Table 1 about here

We use this dataset to estimate the following baseline model:

$$Turnout_i = \alpha + \varphi_{Cen} \cdot D_i^{Cen} + \varphi_{Fed} \cdot D_i^{Fed} + \beta \cdot X_i + \upsilon_i, \quad (5)$$

where $Turnout_i$ reflects voter turnout in municipality *i* (defined as the number of votes cast divided by the eligible population), X_i is a vector of control variables (discussed in the next section), α, φ_{Cen}, φ_{Fed} and β are a set of parameters to be estimated, and υ_i denotes an i.i.d. error component. Our main variables of interest are two dummy variables, D_i^{Cen} and D_i^{Fed}, which indicate whether municipality *i* is a centralized or federal Municipality, respectively (confederal municipalities are the reference group). To assess our hypothesis, we first perform a test on the parameters φ_{Cen} and φ_{Fed} to evaluate whether both are jointly different from zero. With respect to hypotheses H1a and H1b, we expect φ_{Cen} and φ_{Fed} to be significantly negative and positive, respectively.

Taking advantage of the existing literature, X_i includes an elaborate pool of covariates that might affect the utility and/or cost of voting (for an extensive review, see Geys 2006b). First of all, we control for the size of the municipal electorate, as well as the average size of the community-level sub-electorates (including squared terms to account for possible non-linearities). Then, we capture the closeness of an election by computing the difference in the vote shares of the winner and the runner-up in the election.[9] This *ex-post* measurement of closeness

9 Although restricting ourselves to the relative size of the first two parties in our measure of closeness may be overly restrictive in our multi-party setting, measures explicitly aimed at incorporating the vote (or seat) shares of multiple parties such as the 'entropy'-measure proposed in Kirchgässner and Schimmelpfennig (1992) and Kirchgässner and Zu Himmern

is driven by the fact that *ex-ante* data are, unfortunately, not available, i.e., no polls exist at the municipal level and significant changes in the municipal structure prevent the use of historical election outcomes as proxies. We should note here that these controls for size and closeness imply that the municipality-type dummies in our estimation pick up all institutional effects on both B and ρ (as defined in the theoretical section above) that exist in addition to these two elements.[10]

To accommodate the idea that social pressures and interpersonal bonds are likely to vary between rural and urban areas (Riker and Ordeshook 1968; Overbye 1995), we include population density (defined as the number of inhabitants per km^2). As social pressures may likewise be affected by the stability (Hoffmann-Martinot et al. 1996; Ashworth et al. 2006) and/or homogeneity of the population (Cohen 1982; Zimmer 1976), we also control for population mobility – defined as the sum of in- and out-migration divided by the number of inhabitants – and the Hirschman-Herfindahl index of the age structure.[11]

(1997), i.e., $E = -\sum_{i=1}^{n} p_i \ln(p_i)$ with p_i the vote (or seat) share of party i, are problematic as well since they generally depend on the number of parties included in its calculation (which clearly contaminates their measurement of size inequalities between the parties). As there is no commonly accepted solution to this problem, to the best of our knowledge, we gave preference to the relative simplicity of the two-party vote difference.

10 Since some federal states aggregate information on the vote share of non-partisan candidates in their official statistics, the share of such non-partisans can become quite large in our sample. To avoid this biasing our estimate of the election closeness effect, we enter a dummy variable equal to 1 when the share of non-partisan votes exceeds 33% of all votes.

11 In most previous work, population homogeneity is approximated by either racial/ethnic or income diversity. Unfortunately, we lack detailed information for both these indicators. Hence, we instead rely on age dispersion as measured by the Herfindahl-Hirschman index: $\sum_i x_i^2$, where x_i is the share of citizens in a specific age class (age: <3, 3-6, 6-10, 10-15, 15-18, 18-20, 20-25, 25-30, …, 65-75, >75).

Given the generally accepted importance of income and education on voter turnout (Verba and Nie 1972; Pelkonen 2012), we include the share of educationally highly-qualified (defined as the share of population with university degree) and low-qualified inhabitants (defined as the share of population without vocational training and without secondary school education) as well as the share of long- and short-term unemployed people in our model. We also include dummies equal to 1 when the local election takes place alongside EU or state-level elections to control for the fact that concurrent (higher-level) elections tend to boost voter turnout (Geys 2006b). Finally, the remaining unobserved level effects across the German territory are accounted for by an East Germany dummy (which captures all municipalities located in the area of the former GDR) as well as three more federal state dummies (other state-level indicator variables are dropped to avoid linear dependency). Detailed definitions and descriptive statistics for all variables are provided in Table 2.

Table 2 about here

3.2 Econometric issues

As our dependent variable (i.e., turnout) is by definition bounded between zero and one, we require an estimation method that is able to deal with fractional response variables. Ordinary Least Squares (OLS) is inappropriate since it implicitly ignores the bounded nature of the dependent variable and assumes a constant effect for all explanatory variables on turnout over its entire range. Moreover, the predicted values from OLS regression cannot be guaranteed to lie within the 0-1 interval (Papke and Wooldridge 1996). Although frequently

employed, Tobit or logit models also do not solve the specific problems of fractional dependent variables satisfactorily. Applying a two-limit Tobit ensures that the predicted values lie within the unit interval, but this is true by definition and not caused by censoring (Kieschnick and McCullough 2003). A logit transformation makes it difficult to recover the dependent variable from the original conditional mean function, which is the main point of interest in our study (Papke and Wooldridge 1996).

Given that we have no observations on the boundary values of zero and one (see Table 2), two main approaches for estimating Eq. (5) can be considered. The first involves estimating the conditional mean function by maximum likelihood assuming a beta-distribution. The latter approach is consistent, asymptotically normally distributed and fully efficient *if* the assumed conditional density is correctly specified. Most researchers use a mean-dispersion parameterization of the beta-density suggested by Paolino (2001) and Ferrari and Cribari-Neto (2004) to simplify the interpretation of the parameter estimates. In this specification, a functional form is modelled separately for the mean and the dispersion. The beta density can then be parameterized as:

$$f\left(turnout_i \mid \mu_i, \phi\right) = \frac{\Gamma\left(\phi\right)}{\Gamma\left(\phi\right)\Gamma\left(\left(1-\mu_i\right)\phi\right)} turnout_i^{\mu_i\phi-1}\left(1-turnout_i\right)^{\left(1-\mu_i\right)\phi-1} \tag{6}$$

$$\text{with } E\left(turnout_i\right) = \mu_i \quad \text{and} \quad Var\left(turnout_i\right) = \frac{\mu_i\left(1-\mu_i\right)}{1+\phi}, \tag{7}$$

where $\Gamma(.)$ is the gamma function, $0 < Turnout_i < 1$, $0 < \mu_i < 1$ and $\phi > 1$. The mean of the dependent variable now can be modelled using different link

functions, which ensure that its expected value is bounded by 0 and 1. Using the logit link function, we obtain:

$$E\left(turnout_i \mid z_i\right) = \mu_i = \frac{e^{z_i'\pi}}{1+e^{z_i'\pi}}, \tag{8}$$

where z_i stands for a matrix of all explanatory variables in Eq. (5), including the dummy variables, and π subsumes the corresponding parameter vector. As mentioned earlier, the critical drawback of this approach is that it yields inconsistent parameter estimates when the conditional density of the dependent variable is incorrectly specified. Papke and Wooldridge (1996) therefore suggest a quasi-parametric regression model, which assumes only that:

$$E(turnout_i \mid z_i) = G(z_i\pi) \tag{9}$$

The known non-linear function *G(.)* satisfies $0 \leq G(.) \leq 1$. For our analysis, we follow previous research and choose *G(.)* to be the logistic function. Particularly, we employ the quasi-maximum likelihood method based on the Bernoulli log-likelihood function proposed by Papke and Wooldridge (1996), which is consistent and asymptotically normal regardless of the true distribution of $Turnout_i$ on z_i, given that $E(Turnout_i \mid z_i)$ is correctly specified. This quasi-parametric approach does not rely on the specification of the full distribution of $f(Turnout_i \mid z_i, \pi)$.[12]

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12 We carried out both estimation procedures, but focus on the quasi-maximum likelihood (QMLE) results below. The reason is that some evidence suggests that *even if* the beta assumption is valid, the maximum likelihood approach outperforms the QMLE estimator only in certain circumstances (Ramalho et al. 2011). Moreover, to verify that our results are not driven by this particular choice of econometric method, we also performed a further robustness check building on a traditional OLS estimation with a logit-transformed dependent variable (i.e., log(turnout/(1-tunrout))) and Huber-White corrected standard errors. The results remained almost identical (details available upon request).

4. Results

Our central results using QMLE are presented in Table 3 (though similar results were achieved using the beta-regression model, available upon request) and indicate the high explanatory power of the model (R^2 = 0.672). Starting with our central institutional variables, we first of all find that a joint test on the parameters φ_{Cen} and φ_{Fed} confirms their joint significance (p<0.0001). This provides evidence that the institutional design of local public good provision has a strong influence on voter turnout. Moreover, in line with our theoretical expectations, we find that voter turnout is highest in federal municipalities (see hypothesis H1a) and lowest in centralized municipalities (see hypothesis H1b). Particularly, keeping all other explanatory variables fixed, a shift of the institutional setting from confederal (the reference group) to federal, would increase voter turnout by about 2.5% on average. These results support the idea that voters in federal municipalities perceive a larger net benefit of voting, which is driven by the fact that they can express a distinct preference for a set of *policies* (rather than a *party*) and have a higher probability of bringing such optimal outcome about. Similarly, all else remaining constant, a shift of the institutional setting from confederal to centralized, would decrease voter turnout by about 1.9 % on average. This is due to voters' relatively small probabilities of being pivotal in favor of a desired policy, which reduces their incentive to vote at the margin.

Table 3 about here

Importantly, the above findings are driven by the institutional design, and do not reflect the effect of this design on the size of the electorate or the closeness of the

election (as we control for these elements directly). Turning to these control variables, we find that a closer election increases voter turnout, while a larger electorate as well as larger sub-electorates at the community level depress voter turnout, in line with earlier findings. Note that the quadratic effects are weak, such that the negative (sub-)electorate-turnout relation encompasses more than 99% of the entire sample. Higher migration and population density both show a negative – though statistically insignificant – relation to turnout, which may reflect the effect of weaker social ties (and, thus, social pressure to turn out) in densely populated areas and jurisdictions with high population turnover. Education also plays an important role: a larger share of highly (less-) educated residents has a positive (negative) effect on voter turnout. Interestingly, while the long-term unemployment rate returns a negative coefficient estimate, the short-run unemployment rate is positively related to voter turnout. Taking a (possibly unwarranted owing to the ecological fallacy) individual-level interpretation of this result, one could speculate that unemployment produces a decline of individual's social networks and belief in political parties (both of which would depress voter turnout) only after some time. Hence, the lower costs of voting generally imputed to unemployed people may induce higher turnout only in the short run, but are more than offset in the long run by the social and political implications of (prolonged) unemployment. More research, however, would be required to validate such a proposition.

Finally, we find that turnout rates are substantially lower in the former socialist eastern part of Germany, and that concurrent elections do not always increase voter turnout. More specifically, our findings suggest that concurrent state-level elections increase voter turnout, while the opposite appears to occur with respect

to concurrent EU elections. The latter could indicate that EU elections are still perceived as second-order elections. Still, some care should be taken in this interpretation since this result may be confounded by a potential time effect (since there is only one EU election in our sample and, hence, all concurrence between local and EU elections refers to the same point in time).

5. Conclusion

Building on the fiscal federalism and public choice literatures, this article provided a first look into the relation between the institutional design of (local) public good provision and voter turnout. Theoretically, we argue that different institutional designs for public good provision affect voters' turnout calculus *at the margin* by affecting the net benefit of voting on Election Day. The ensuing hypotheses were tested using a dataset on local-level elections in Germany, where a substantial variety of institutional designs can be observed in the provision of the same broad set of local public goods.

Our inquiry provided two key results. First, and most generally, we found supporting evidence for the hypothesis that institutions beyond those concerning the design of elections (such as compulsory voting, registration system, electoral system, postal or Sunday voting, quorum rules, concurrent elections) can have an effect on voter turnout. Second, we illustrate that (de-)centralization of (local) public good provision drives voters' turnout decisions at the margin in line with predictions derived from a simple rational-choice Downsian framework. Voter turnout is lowest in fully centralized municipalities and highest in federal municipalities – compared to the reference group of confederal municipalities. Allowing voters to express more detailed preferences regarding local public goods depending on the geographic reach of these public goods thus increases turnout.

Within the Downsian framework adhered to in our theoretical discussion, decentralization increases voter turnout by increasing the perceived net benefit of casting a ballot in favor of one's preferred policy bundle. Interestingly, a similar prediction can also be derived from an expressive voter perspective. One could indeed argue that expressive utility is highest in federal municipalities – compared to confederal and centralized municipalities – because two votes allow one to express more options (and thus gain more expressive utility) than does one vote. Still, the observed difference in turnout between confederal and centralized municipalities would appear harder to explain from such an expressive perspective – whereas it is compatible with the instrumental model.

Overall, our findings support the classical idea – incorporated in the principles of fiscal equivalence (Olson 1969) and the decentralization theorem (Oates 1972, 1999) – that there should be a close relationship between the geographic reach of public goods and the decision authority responsible for their provision. Assigning responsibility to the 'right' level of government appears not to have positive effects only on the efficiency of public good provision (Olson 1969; Oates 1972, 1999), but also on voter turnout.

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Figure 1: Three types of local government

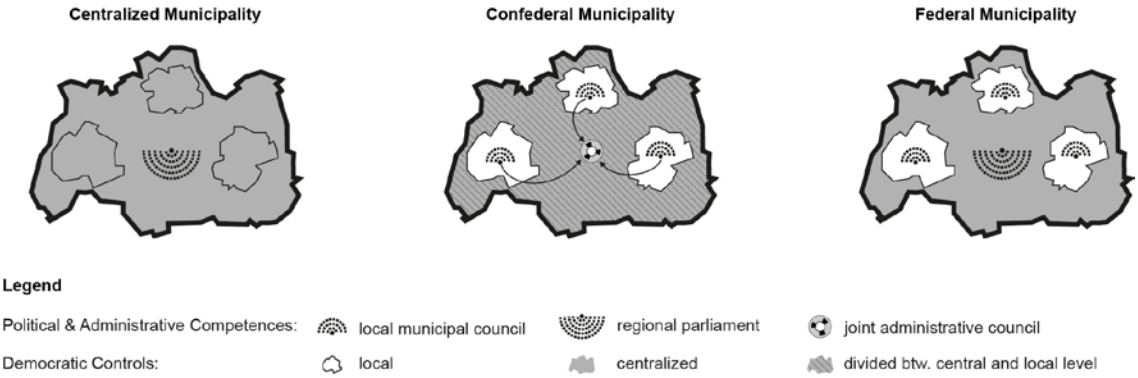

Figure 2: Benefit of voting under optimal policy choice (B^{Fed}) vs. optimal party choice (B^{cen}, B^{Con})

optimal policy choice

	Party Y	***Party Z***
$\boldsymbol{U_{com}}$	1	2
$\boldsymbol{U_{mun}}$	3	1

$$B^{Fed} = |1-2| + |3-1| = 3$$

optimal party choice

	Party Y	***Party Z***
$\boldsymbol{U_{com}}$	1	2
$\boldsymbol{U_{mun}}$	3	1

$$B^{Cen} = B^{Con} = |(1+3)-(2+1)| = 1$$

Table 1: Structure of the sample

Federal state	Date of election	Concurrent elections	Municipal type		
			A	B	C
Schleswig-Holstein (SH)	2 March 2003		101	118	–
Rhineland-Palatinate (RP)	13 June 2004	EU	37	–	163
Baden-Wuerttemberg (BW)	13 June 2004	EU	179	272	–
Brandenburg (BB)	26 October 2003		143	54	–
Mecklenburg-Western Pom. (MV)	13 June 2004	EU	52	97	–
Saxony-Anhalt (ST)	13 June 2004	EU	39	157	–
Thuringia (TH)	13 June 2004	EU, state	118	130	–
Total			669	828	163

Table 2: Variable definition and descriptive statistics (N=1660)

Variable definition		Summary statistics		
Variable	**Description**	**Mean**	**SD**	**Min; Max**
Endogenous variable				
Turnout	Votes cast / eligible voters	0.5483	0.0827	0.28; 0.77
Explanatory variables				
D_i^{Cen}	Dummy=1 for centralized municipalities	0.4753	0.4995	0; 1
D_i^{Fed}	Dummy=1 for federal municipalities	0.0982	0.2977	0; 1
Electorate	Number of eligible voters (in 1000)	9.914	8.5791	0.28; 80.05
Sub-electorate	Average number of eligible voters within sub-electorates of municipality (in 1000).	5.357	7.089	0.02; 80.05
Closeness	Difference between winner and runner-up (in %)	0.2874	0.202	0;1
Non-partisan votes	Dummy=1 if average share of non-partisan votes exceeds 33.3%	0.5313	0.4992	0;1
Population density	Number of inhabitants per km^2 (in 1000)	0.2476	0.3110	0.01;2.52
Population mobility	In- and out-migrants / total population	0.1144	0.0344	0.02; 0.54
HHI age	Herfindahl index of municipal age-structure	0.0698	0.0034	0.06; 0.11
Long-term unemployment	Number unemployed over 12 months / total population	0.0282	0.0541	0; 0.73
Short-term unemployment	Number unemployed under 12 months / total population	0.0786	0.1310	0.0001; 1.73
Education high	% population with university degree	0.0143	0.0197	0; 0.53
Education low	% population without vocational training and without secondary school education	0.0334	0.0257	0; 0.25
Dummy EU election	Dummy=1 if concurrent EU election	0.7494	0.4335	0;1
Dummy state election	Dummy=1 if concurrent state election (only Thuringia)	0.1494	0.3566	0;1
Dummy east	Dummy=1 if municipality was in former GDR	0.4759	0.4996	0;1
Dummy RP	Dummy=1 if municipality is located in Rhineland-Palatinate	0.1205	0.3256	0;1
Dummy BW	Dummy=1 if municipality is located in Baden-Wuerttemberg	0.2717	0.445	0;1
Dummy MV	Dummy=1 if municipality is located in Mecklenburg-Western Pomerania.	0.0898	0.2859	0;1

Table 3: Quasi-maximum likelihood (QMLE) estimation results

Variable	**Parameter estimates**			**Marginal effects**	
	Coef.	**Std. error**	***P>|z|***	***dy/dx***	**Std. error**
Centralized Municipality	-0.0763	0.0209	0.000	-0.0189	0.0052
Federal Municipality	0.1010	0.0400	0.012	0.0250	0.0099
Sub-electorate	-0.0192	0.0041	0.000	-0.0038	0.0010
Sub-electorate squared	0.0003	0.0000	0.001	–	–
Electorate	-0.0119	0.0021	0.000	-0.0024	0.0004
Electorate squared	0.0001	0.0000	0.000	–	–
Closeness	0.3710	0.0849	0.000	-0.0038	0.0242
Closeness squared	-0.2460	0.0905	0.007	–	–
Non-partisan votes	0.0571	0.0126	0.000	0.0141	0.0031
Population Density	-0.0245	0.0263	0.352	-0.0061	0.0065
Population Mobility	-0.2530	0.1590	0.111	-0.0627	0.0394
HHI Age	2.2780	1.8960	0.230	0.5640	0.4694
Short-term unemployment	0.9070	0.2810	0.001	0.2245	0.0696
Long-term unemployment	-1.9500	0.6710	0.004	-0.4828	0.1661
Education high	0.0003	0.0002	0.168	0.0001	0.0001
Education low	-0.0020	0.0004	0.000	-0.0005	0.0001
Dummy EU election	-0.2730	0.0220	0.000	-0.0677	0.0055
Dummy state election	0.3980	0.0217	0.000	0.0985	0.0054
Dummy East	-0.3300	0.0241	0.000	-0.0818	0.0060
Dummy RP	0.3270	0.0435	0.000	0.0811	0.0108
Dummy BW	0.2410	0.0304	0.000	0.0598	0.0075
Dummy MV	0.1300	0.0230	0.000	0.0321	0.0057
Constant	0.3950	0.1410	0.005	–	–
R^2	0.672				
Number of observations	1,660				